

THURSDAY, JANUARY 3, 1895.

BIOLOGICAL LECTURES AND ADDRESSES.

Biological Lectures and Addresses delivered by the late Arthur Milnes Marshall, M.A., M.D., D.Sc., F.R.S.
 Edited by C. F. Marshall, M.D., B.Sc., F.R.C.S.
 (London: Nutt, 1894.)

MANY of us remember the pleasure experienced in listening to the vigorous addresses of Prof. Milnes Marshall, whose sudden death, about a year ago, was such a blow to biologists and to all interested in the spread of scientific education. In reading them now, the energy and humour of the speaker are ever present in the memory, giving life to the apt illustrations and clearly expressed thoughts.

The choice of appropriate subjects for the occasion of these addresses shows remarkable discrimination. It is quite clear that the late Prof. Milnes Marshall believed that a single address—if heard at the right point in his career, and delivered with the confidence of this belief—might change the whole attitude of mind with which a student approached his subject.

Lecturing to the Owens College Medical Students' Debating Society, he chose as his subject "Embryology as an aid to Anatomy." In preparing to address a class of students expected to deal with, and to remember, in the course of their daily work, innumerable details which are as yet far from receiving a scientific interpretation, he selected embryology, which "offers an explanation of many otherwise completely unintelligible anatomical facts"; and by the example of the development of the nerves supplying the muscles of the eye, the thoughts of many young anatomists may well have been turned into a direction which was of the most inestimable benefit to their study.

Equal wisdom and foresight were shown in the selection of subjects for addresses to the Members of the Manchester Microscopical Society, viz. "Inheritance" (1888), "The Shapes and Sizes of Animals" (1889), "Some Recent Developments of the Cell Theory" (1890), and "Death" (1893). In the choice of these subjects, and in their treatment, the Members of the Society are shown that the most profound biological problems are to be approached and, perhaps, solved by the study of the most minute detail and the lowest forms of life. The student thus made fully aware of the dignity and possibilities of his subject, will not be likely to forget, in the patient investigation of histological or biological detail, the wide issues which are at stake.

The subjects chosen for presentation to other audiences are just as happy. Sometimes, as in "The Theory of Change of Function," a difficulty in evolution by natural selection is taken as the subject, and the final solution given in the clearest and simplest manner. It would be well if this address were widely known, for the difficulty it deals with is still frequently raised, just as if no explanation had ever been forthcoming. In other cases, wide questions, such as "The Influence of Environment" or "Animal Pedigrees," form the subjects of the addresses.

The addresses abound in humorous and apt illustrations. Thus, on p. 39, in order "to show that, even in our worldly transactions, changes of environment often produce not only direct and immediate changes and readjustments, but also definite and calculable ones," he gives as an example the following:—"Let *a* be a merchant, and *b* his purse: the combination *ab* will at once strike you as a natural and stable one. . . . Now let *c* be a highwayman, and *d* his pistol: the combination *cd* is again recognised as a natural and stable one. Now, bring the compound *ab* into the presence of the compound *cd*, and mark how the stability of the former is shaken. . . . The several elements become rearranged in a manner that finds perfect expression in the formula—

$$ab + cd = a + bcd."$$

Again, in order to illustrate the tendency towards reversion to an ancestral condition, the card house is selected—

"The resulting structure is a far more imposing one than the pack of cards when laid flat on the table, but it is also an eminently unstable one, its instability being directly proportional to the extent to which it departs from its initial condition." (p. 104.)

"The influence of food yolk on development" is compared to "that of capital in human undertakings" (p. 224), the metaphor being worked out in an interesting and amusing manner. Prof. Weismann's views on the absence of death in Protozoa are illustrated on p. 273 as follows:—

"If the original *Amœba* be called Tom, and the products of fission Dick and Harry, the upshot of the process may be expressed by saying that Tom has disappeared without having died, while Dick and Harry have come into existence without having been born. Nothing has died, there is no corpse to bury, and our ordinary ideas with regard to individuality and identity fail altogether to afford answer to the question—Where is Tom at the end of the process?"

There are a few sentences in the addresses which are perhaps capable of misconstruction. Prof. Milnes Marshall appears to have hesitated to accept the belief in the hereditary transmission of acquired characters, and yet there are some statements which seem to imply this belief. This is the case with the statements that the white man and the negro have been evolved "through the long-continued action of selection and environment" (pp. 247 and 358), that modifications of development have occurred "due chiefly to mechanical causes" (p. 316), that the "larger size of the eggs of fresh-water forms appears to be dependent on the nature of the environment" (p. 313), although in this case it is clearly shown on the following page that environment is believed to act selectively and not directly.

The term "acquired character" is made to bear still further burdens in the way of special interpretations. It was unfortunate so late as 1890 to continue to speak of the distinction in development "between those characters which are really historical and inherited, and those which are *acquired* or spurious additions to the record" (p. 307), or to speak of the view that Amphioxus and the Cyclostomes are "degenerate animals—whose simplicity is *acquired* and deceptive rather than real and ancestral." (p. 335.)

The book is well and clearly printed, and has been extremely well edited. The only printer's error noted was in the title of Mr. Oldfield Thomas' paper on p. 318. E. B. P.

TEXT-BOOK OF AGRICULTURE.

Advanced Agriculture. By H. J. Webb, Ph.D., B.Sc. (Lond.). 8vo., pp. vi. and 672. (London: Longmans, Green, and Co., 1894.)

TEXT-BOOKS of agriculture are rapidly increasing in number. The name of the author on the title-page of this is that of the late Principal of the Agricultural College at Aspatria, Cumberland, who, most unfortunately, was unable to complete the work. He was struck down at a comparatively early age, and in the midst of hard work and a successful career. He is most highly spoken of, and deservedly so, in the preface by the editor of the book, Mr. J. Lister, of Aspatria. From such hands we anticipated much and good work, though the task might appear heavy. We regret to say that we have been greatly disappointed.

We are told that—

"This work, though primarily intended for the advanced stage of the Science and Art Departments' Examination in Principles of Agriculture, will also cover the greater part of the syllabus of the Honours stage. Care has, however, been taken not to adhere too rigidly to the syllabus in question, and we trust it may be found equally serviceable for the examination for the diploma in Agriculture of the Highland and Agricultural Society in Scotland, and the senior examination of the Royal Agricultural Society of England."

Even the fact that the book has been prepared mainly to assist students to pass examinations, can hardly excuse some of the statements we meet with. In agricultural geology we are told, among other scraps of information that zeolites are "hydrated silicates of alumina or lime." This is scarcely true. "Diorite consists of plagioclase and hornblende." This is true, but as the meaning of plagioclase is nowhere explained, it does not help the student much. In agricultural physics we learn that "a heavy soil might contain absolutely double the amount of phosphoric that a light soil did, although it would show only the same percentage if it were twice as heavy." We have tried to believe this, but till now we do not understand it. In engineering, a definition of horsepower is given without any mention or suggestion of time as a possible factor.

In chemistry, Rendonda [Redonda] and Alta Vela phosphates are said to contain a large quantity of *alum*; leather to contain $4\frac{1}{2}$ to 9 per cent. of *ammonia*, and meat-meal and meat-guano to contain much *ammonia*. This is the more confusing, as in other manures, mentioned on the same page, the percentage of *nitrogen* is correctly given; but this confusion of ammonia with the ammonia equivalent of the contained nitrogen is common throughout. Ammonium chloride is said to contain about $18\frac{1}{2}$ per cent. of water and $32\frac{1}{2}$ per cent. of ammonia. The formula of monocalcic phosphate is correctly given as $\text{CaH}_4\text{P}_2\text{O}_8$, and tricalcic phosphate as $\text{Ca}_3\text{P}_2\text{O}_8$, and, yet, in one analysis 18.01 per cent. of the former is said to be equal to 28.1 per cent. of the latter, and in another case 19.2 per

cent. of monocalcic phosphate is said to be equal to 30.07 per cent. of tricalcic phosphate made soluble: of course the so-called monocalcic phosphate in these analyses is calcium metaphosphate, formerly known as "biphosphate"; but how can the student know this? Cellulose is described as a white amorphous powder.

In agricultural botany, we are told that "protoplasm generally presents itself as a granular semi-fluid substance with or without a cell-wall." "The corolla, when present, usually consists of green leaves or sepals, sometimes scarcely noticeable." This later statement is, of course, only a misprint; but it is also only an example of several similar serious misprints.

The root residues of crops remaining in the soil are said to "consist very largely of protoplasm." The section on farm crops, however, in which this occurs, is written in a curious style, somewhat difficult to follow.

On looking up information regarding anthrax, we find that "although a disease of the blood, the writer [in this case Mr. H. Thompson] considers it more of a dietetic nature, having seen it produced from steeped brewers' grains allowed to stand till they had reached the acetous stage of fermentation. It is also produced by the hay bacillus, obtained from the fermentation of chopped hay and from mouldy cotton-cakes, more particularly the undecorticated variety. He has also seen it arise in certain undrained lands. Although very fatal to other animals, such as dogs, cats, and poultry, that may have eaten the flesh or blood, yet he considers it neither infectious nor contagious, having never known it to extend beyond the buildings in which it originated. Again, the disease was always traceable to some peculiarity of the feeding, and the writer thinks that it is analogous to an aggravated form of *red water*." And this stuff is set forth as *advanced* agriculture. There are several very startling statements in the chapter on veterinary science; e.g. in retention of the foetus, "different bones belonging to the foetus, such as jaw, scapula, ribs, humerus, and several others, are passed at times through the rectum."

In the chapter on agricultural entomology, we hardly suppose the author is serious when he recommends the use of rape-cake, at the rate of two or three tons per acre, to clear the field of wire-worms.

In part ii. of the book the misstatements are perhaps not quite so numerous or so serious, but they are not absent. In the chapter on permanent pastures, after a notice of the power which leguminous plants, with the aid of the low organisms present in the nodules on their roots, possess of appropriating free nitrogen, we are told that "this fact of the nitrogen-storing power of the leguminous plants explains the action of heavy dressings of nitrogenous manures on permanent pastures encouraging the growth of grasses, especially the coarser ones, at the expense of the clovers." We fancy that this *explanation* of the fact will not satisfy many readers.

The work of Rothamsted is frequently referred to and fully appreciated; but why should Rothamsted be spelt in three different ways in the book? Probably, however, every would-be advanced agriculturist knows that there are not three Rothamsteds.

But we have given enough instances of what are very serious flaws in the book. Much of the matter is exceedingly good and useful; but does not this really add to the